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Successor to the Geological Newsletter

December 1956

Volume 1, No. 6

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American Geological Institute

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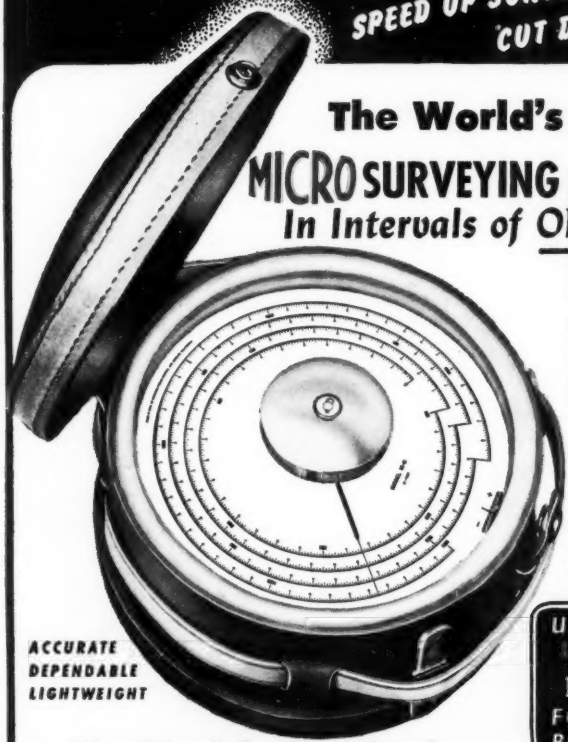

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Calendar

Cooperation of Society Secretaries in supplying meeting notices for GEOTIMES calender is requested.

Dec. 3-4, 1956—SECOND ROCK PRODUCTS CONFERENCE sponsored by Univ. Extension, Kans. Ls. Assoc. & the Geol. Surv. of Kans. for Kansas limestone producers. Univ. of Kans., Lawrence.

Dec. 10-12, 1956—AMERICAN NUCLEAR SOCIETY, Sheraton-Park Hotel, Washington, D. C.

Dec. 26-29, 1956—A.A.A.S., Hotel New Yorker, New York City.

Jan. 14-16, 1957—COUNCIL OF ENGINEERING SOCIETIES, annual meeting, Statler Hotel, New York City.

Jan. 14-26, 1957—WORLD METEOROLOGICAL ORGANIZATION, 2nd Session of the Commission for Climatology, Washington, D. C.

Jan. 17-18, 1957—ENGINEERS JOINT COUNCIL, third General Assembly, Statler Hotel, New York City.

Feb. 24-28, 1957—A.I.M.E., Annual Meeting, Hotels Roosevelt and Jung, New Orleans, La.

Mar. 3-9, 1957—ASP - ACSM Consec. mtgs., and co-exhibit, Shoreham Hotel, Washington, D.C.

Mar. 4-8, 1957—PITTSBURGH CONF. ON ANALYTICAL Chemistry and Applied Spectroscopy, Pittsburgh, Pa.

Mar. 10-16, 1957—SECOND NUCLEAR ENGINEERING & SCIENCE CONGRESS, sponsored by EJC, AGI participating. Convention Hall, Phila., Pa.

Mar. 19-21, 1957—AMER. METEOROLOGICAL SOC., 151st Nat. Mtg., Univ. of Chicago, Chicago, Ill.

April 1-4, 1957—A.A.P.G., National Convention, Kiel Auditorium, St. Louis, Mo.

April 5, 6, 1957—PACIFIC SOUTHWEST MINERAL INDUSTRY CONF., sponsored by Nevada, San Francisco & So. Cal. Secs. of A.I.M.E., Reno, Nev.

April 19-20, 1957—G.S.A., Cordilleran Sec., ann. mtg.; P.C. Br. of P.S. & the S.S.A. also meet at UCLA, Los Angeles, Calif.

April 29-May 1, 1957—AMERICAN GEOPHYSICAL UNION, 38th Annual Meeting, Washington, D. C.

May 5-9, 1957—AMERICAN CERAMIC SOCIETY, 59th Ann. Mtg., Statler Hilton Hotel, Dallas, Tex.

May 7, 1957 — INTERNATIONAL HYDROGRAPHIC CONF., Seventh Congress, Philadelphia, Pa.

May 16-18, 1957 — G.S.A., SOUTHEASTERN SECTION, Morgantown, W. Va.

1957-58 — INTERNATIONAL GEOPHYSICAL YR.

July 10-19 — INTERNATIONAL UNION OF CRYSTALLOGRAPHY, 4th General Assembly & International Congress. McGill Univ., Montreal, Quebec.

August, 1957—INTERNAT. ASSOC. OF SEISMOLOGY & Physics of the Earth's Interior, Toronto, Ont.

August, 1957—INTERNATIONAL ASSOC. OF PHYSICAL OCEANOGRAPHY, General Assembly, Canada.

Sept. 9-10, 1957—AMER. CERAMIC SOC., Basic Science Div., State U. of N.Y. Coll. of Ceramics, Alfred Univ., Alfred, N.Y.

Oct. 14-18, 1957—Internat. Industrial Development Conference, sponsored by Time-Life International & SRI, Fairmont Hotel, San Francisco, Calif. Attendance by personal invitation.

1960—XXIst INTERNATIONAL GEOLOGICAL CONGRESS, Copenhagen, Denmark. Field excursions to Scandinavian countries.

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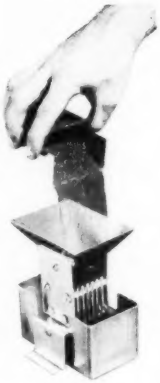

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Successor to the Geological Newsletter

Published by **THE AMERICAN GEOLOGICAL INSTITUTE**

Robert C. Stephenson, EDITOR

Kathryn Lohman, CIRCULATION MANAGER

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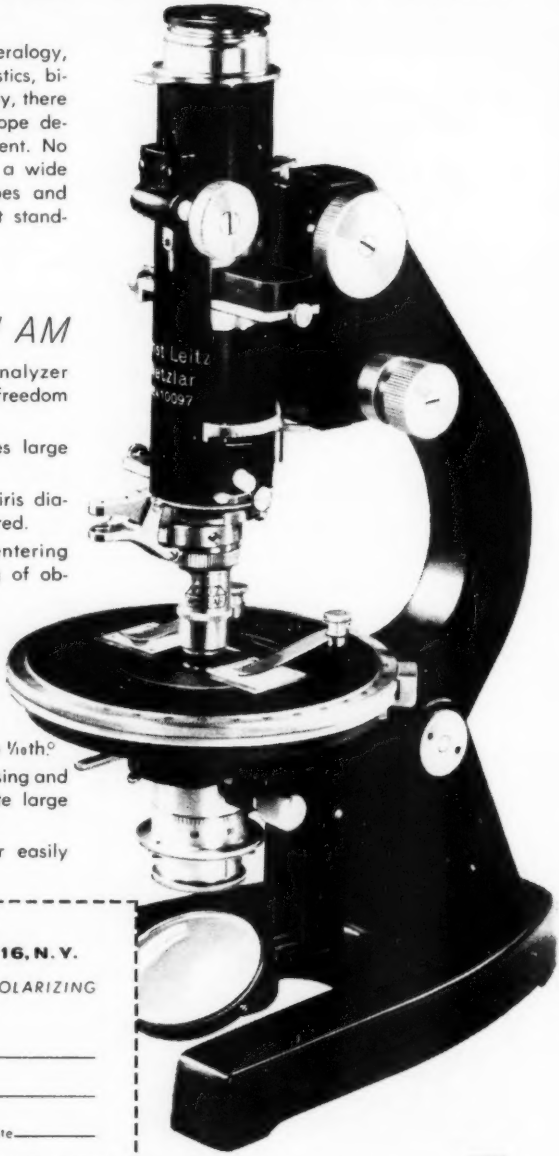

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Plan Ahead

There are many reasons why the geological scientists should be taking a serious look into the future. We should know in advance as much as possible about what lies ahead for our profession, in order that we may shape our course of action.

One reason that prompts introduction of this subject is the fact that a segment of the profession queries, "Are we headed toward an over-supply of geoscientists?" With the dawn of nuclear energy for peace-time applications, many engaged in petroleum exploration are apprehensive over the future of exploration, especially with the costs of finding new oil spiralling toward the point of diminishing returns. Although this may represent the view of only a pessimistic few, we cannot, as yet, authoritatively contradict this position nor ignore it.

A more positive reason for looking at the future is to determine the areas of scientific and technical service in which applications of geological knowledge are essential, in order that we may direct our energy toward these areas. We should, as a profession, analyze the potentialities of future applications of geology and move to stake out these areas for our profession. Perhaps it is because we have lacked a central rallying point that we have all but lost by default certain activities in which persons with geological training should be the key workers.

The academic institutions which produce our resources of geological and geophysical talent deserve to have the best possible predictions as to the future course of our profession so that they may shape curricula and policies. Requirements for graduates in geology might well be raised and recruitment policies and training standards of industry tightened, with the ultimate goal of achieving better exploration results for less money. If geoscientists are to concentrate more in other fields of application—engineering, for example—then some academic reorientation seems inevitable.

We owe it to ourselves and the future of our profession to look ahead.

OUR COVER

The staff of the American Geological Institute and GeoTimes wish you a Merry Christmas. So does our cover boy, "George" Times.

The AMERICAN GEOLOGICAL INSTITUTE is a non-profit professional service organization established and managed by the scientific societies in the fields of geology and geophysics in cooperation with the National Academy of Sciences-National Research Council. It is the instrument of the profession serving and advancing the welfare of the geoscientist in matters relating to education, professional responsibilities and government relations. It is an active member of the Scientific Manpower Commission. It also functions in the stimulation of public education and awareness of the earth sciences, through career literature, the scouting program and other channels of communication.

GEOTIMES is the news magazine of the geological sciences. It reports on current events in the earth sciences, public education and public relations efforts throughout the profession, as well as appropriate legislative and governmental issues. It announces scholarships, fellowships, publications and new developments. It provides a forum for discussion of timely professional problems, and affords a common bond between the many specialized groups within the earth sciences.

IMPRESSIONS OF A YOUNG FRENCH GEOLOGIST visiting the UNITED STATES

by

PIERRE Y. MOUSSEL

This is not an attempt to make a thorough analysis of the oil industry in this country and in France, nor to compare the achievements in both countries. These are reflections which may come to the mind of a young Frenchman, after touring the United States about five months.

The French oil industry has a main characteristic—its youth. Some prospects were tested before the World War II and small production was found in Metropolitan France and in French Morocco but, true launching of production occurred in 1945. Skeptical at first, the average French citizen became more confident with the Lacq discovery (1948) in the Bordeaux basin. Also the Parliament has voted and appropriated every year a substantial amount of money to support the effort of the oilmen. But the big event has been the Parentis discovery (1954) also in the Bordeaux basin. Parentis appears to be a major oil field, at least on the European scale, as it was pointed out in a paper given at the convention of the SEGp in October 1955. Within six months, one share of the company, owning the Parentis field, jumped from $18 to $350, to be finally stabilized at $243. We had discovered both oil and speculation! Scores of newsmen began to write hundreds of articles about prospecting sometimes in very strange terms for a technician knowing the subject, but anyway the large project of 1945 had started to bear fruit both in France and overseas and the effort is increasing every day.

The young oil companies have faced some crises of growth, e.g. difficulties of organization, difficulties in getting supplies and services from abroad due to current exchange problems and lack of manpower. We have had for a long time many people interested in pure geology, and with some special training in petroleum geology they could do pretty well, but in geophysical prospecting everything had to be created. Now at the Institut Francais du Petrole (French Institute for Petroleum) people graduate in geophysics and afterwards complete their training by a practical stay in some of the numerous crews operating all around the country. However, the average age of a geophysicist is 30-35; so that they are facing heavy responsibilities at the very beginning of their career.

Technically, what you currently do in the U. S. is not very different from what we actually do in the Eastern Hemisphere. Most of our equipment comes from the U. S. and your salesmen take care to advertise the latest fashions in France. As a matter of fact, we use relatively more "potential methods" than you do: gravity and magnetism are well advocated and different electrical methods are also used with success. Remember, incidentally, that the Schlumberger brothers were French and had developed some techniques of "surface geophysics" before any attempt at well-logging.

The French oil companies are willing to send their men to this country every time it's possible, because the U. S. remains the place where the effort of prospecting is the biggest. I think for my-

Continued on page 8

[1] *M. Pierre Y. Moussel of the Bureau de Recherches de Petrole (Paris) is a graduate of the School of Mines in that city and is primarily a geologist although at present engaged in geophysics. He has spent the past two years in travelling and training in geophysics.*

IS GEOLOGY A SCIENCE?

by

PRESTON E. CLOUD

The question is sometimes asked nowadays whether a primarily empirical activity or group of activities such as geology can properly be considered a science. Indeed, it seems evident that geologists are not without misgivings of their own in this matter. Some, whose work involves quasi-experimental procedures or other differences from supposedly orthodox geology, have dissociated themselves from the mother profession. Others find that geology exists only as the application of other sciences to problems of earth history, and a militant minority extols the supremacy of geology, or of its particular brand of it, and disclaims the need for the participation of allied disciplines in the solution of geological problems.

To ask whether geology is science is like asking whether painting is art, or whether paleontology is geology. It depends on how it is practiced. If it is practiced in objective accordance with the strategy and tactics of the scientific method, so as to contribute to the general body of understanding of the material universe, it is science. If it is a scientific discipline contributing primarily to the understanding of earth history, structure, or composition, it is geology. It is not enough, and it is also misleading, to say that science must follow experimental procedures. The alchemists were experimentalists and the astronomers are not.

In the case of the experimental disciplines the experiments must be repeatable, with similar results, by other workers, if the activity is to qualify as science; and hypotheses based on experimental data should have testable corollaries by means of which their validity may be confirmed or discredited. In order that it may be repeatable, an experiment must be described in orderly sequence, setting forth just what effects were caused by defined procedures.

An orderly sequence of observations described with such precision that an objective observer, reexamining substantially the same evidence, would see substantially the same things, is the equivalent of the repeatable experiment in the empirical sciences—the recoverable observation, as it were. Just as some experiments are trivial, so some observations are trivial; and in both the experimental and the empirical sciences recoverability is never absolute but must take account of the significance of figures, parallel instead of identical observations, and the quibbles of symbolic logic.

The humblest observation or experiment, if so performed and described as to be repeatable, and if new or significant in testing what was previously believed known, is a contribution to science. This, in fact, is the backbone of science; but no scientific discipline should stop here. The body of observed facts or results is the frame on which the tapestry of interpretation should be woven, and the hypotheses that comprise this tapestry are fruitless unless they lead to the prediction of other events or facts that must fit the scheme if it is right. These are the testable corollaries.

Insofar as any activity consists of the permanent, disciplined, and accurate recording of repeatable observations leading to the formulation or testing of hypotheses, it is science; and if it contributes primarily to the understanding of earth history, composition, or structure it is geology. Recoverability of the data is the crux, and the historical aspect the central theme. No one whose activities fulfill these requirements need hesitate to call himself a scientist and a geologist.

Let us bear in mind, however, that geology gains prestige and maturity with each move that facilitates the recoverability of its observations, increases the meaningful quantification of its conclusions, promotes more rigorous review of the testable corollaries, or further exploits the adjoining realms of science.

MANPOWER *in a column —*

By HOWARD A. MEYERHOFF
Scientific Manpower Commission

A GI who has just returned to AGI writes: "Many geologists who have recently served their terms of induction in the United States Army with the status of scientific and professional personnel would appreciate information about their remaining years of military obligation."

There are two existing sets of regulations that will operate concurrently until August 9, 1957. The Universal Military Training and Service Act of 1951 as amended still applies to men inducted prior to August 9, 1955. After the latter complete two years of active duty, they have a six-year reserve obligation, three of which are to be spent in the ready reserve, and three in the standby. For men who entered the service on or after August 9, 1955, the Reserve Act of 1955 applies, and their total reserve obligation is but four years, three in the ready reserve and one in the standby.

The Reserve Act of 1955 contains two provisions that may shorten the length of service in the ready reserve. The first is the numerical limit fixing the total strength of the reserve. As soon as this limit is reached, the Army will screen excess ready reservists into the standby. The process will be automatic, and those with the shortest remaining reserve obligation will be the first to be screened.

The second provision applies specifically to geologists, geophysicists, and others with critical skills. These men will be screened from the ready to the standby reserve automatically whenever there is a surplus over and above the Army's requirements for their professional skills. One exception is to be noted. If the inductee has acquired a military skill, he may be retained in the ready reserve so long as there is an unfilled need for his specialty. Men who have the shortest remaining reserve obligation will be the first to benefit from the screening process. Hence, those who have met their military obligation by enlistment in the reserve program, involving 6 months of active training and 7½ years in the reserve, will be moved from the ready to the standby reserve more slowly than two-year inductees.

The ready reservist remains under the direct jurisdiction of the Department of the Army and must meet his reservist obligation if he entered the service on or after August 9, 1955. The standby reservist, on the other hand, can be recalled only through the routine procedures of the Selective Service System.

French Geologist *Continued from page 6*

self that a trip to the U. S. is of great educational value.

From another point of view, I have been surprised to find in various places some friction or misunderstanding between geologists and geophysicists. Many distinguished people have been saying for many years that exploration must be considered as a whole, and I thought with some naivete that the necessary collaboration of the two sciences was a well established article of faith. Both geologists and geophysicists are perfectly right to be proud of their own achievements, but, the intrication of the problems growing very fast, every isolated effort would be lost. The "ivory tower" policy has never proved to be effective. I am absolutely sure that the coming generations will iron out these imperfections, because your oil industry proves every day to be lively, dynamic and full of health. Your institutions, your laws, your habits contribute to this strength, which has its roots in the intimate personality of the American geologist and geophysicist. We like the things planned and organized by logic; you like competition and the individual effort of the man who takes his own chance. You focus your attention in the practical issues of a problem while we very often try to solve it for its own academic beauty. This is obviously too schematic but explains to a certain extent our different attitudes which are not only true for oil exploration.

Difficulties of languages and great distances make it almost impossible to realize how the people live and think in a foreign country. I am very happy to have been able to stay a few months in the U. S.; it's been a wonderful experience, because our countries, both of them, have much to learn from each other, for a better appreciation of their own achievements and a better understanding of their actions.

After all, an American geologist on an outcrop in Colorado is very much like a French geologist in the Alps mountains. Are they not brothers?

Geologic Education

a report by
RICHARD M. FOOSE

Geologic education and the nature of its geologic product was one of the liveliest subjects at the recent meetings of the Association of Geology Teachers in Minneapolis. Of interest to students, teachers and industry alike, this subject was treated in a symposium in which five college and university teachers and a member of the oil industry presented outstanding papers expounding their views on geologic education. Both statistics and philosophy had generous treatment and it was interesting to perceive that statistics and philosophy did not always agree but, on the other hand, frequently were in close accord. In an attempt to explain the nature of our product Professor Chalmer Roy, of Iowa State College, presented a series of graphs to portray the education and degree of professional competence of our young geologists relative to those being trained in physics, chemistry, and biology. It is an interesting fact that the geology teachers in our colleges and universities have a generally better impression of their own product than do the teachers of the other sciences. On the other hand, this good impression might be unwarranted because the basic statistics would indicate equal or superior professional competence for those students in the other sciences. This seems to be a clear call for all geology teachers to critically appraise their new-born products and be more discriminating with their glowing recommendations.

Younger readers of GEOTIMES especially will probably be interested to learn what things all members of the symposium agreed upon in connection with training the young geologist. Judging from the enthusiastic discussion, these items are of keen interest to teachers and representatives of industry as well. They are (1) to stress those courses in geology and the associated sciences that deal with fundamental principles, (2) to eliminate the large majority of applied geology courses that clutter so many undergraduate curricula, (3) to encourage the taking of more courses in the humanities and social sciences, thus enlarging and strengthening the liberal arts background of the young scientist, (4) to insure adequate field training either through the medium of the summer field camp or increased field work in connection with regular undergraduate courses, and (5) to emphasize the need for effective communication through speech and writing.

According to Professor Herbert Hendriks of Cornell College, minimum requirements for graduation, based on statistics from all undergraduate departments in the country, are approximately 35-40 hours of geology, 8-10 hours each of physics, chemistry, biology, and mathematics. The need for greater uniformity of requirements was stressed. Whereas such undergraduate training in geology and the other sciences is normally adequate for both admission to graduate school and for employment, additional courses in chemistry and physics are needed by the student planning to pursue graduate studies in geophysics or geochemistry.

Speaking for the petroleum industry, Mr. Guy Daniels, of the California Co., strongly advocated all of the items named above and also pointed out that the man who would be best prepared for adequate professional employment and future advancement should carry his educational training through the master's degree level. While this does not mean that there are not large numbers of jobs available to those who have only the bachelor's degree, it clearly indicates that those who wish to participate as leaders in the dynamic growth of our science should have advanced formal academic training.

While no final answers were derived from the symposium, it is clear that the various elements involved in geologic science, namely the students, the teachers and the employer, are coming closer to agreement on the kind of product they want. It is especially encouraging to teachers in our universities and colleges to perceive the tremendous interest expressed in the curricula for the geology student by responsible members of the mining and petroleum industries. At too many times in the recent past the teacher has felt as though he were in an isolated position, blindly trying to meet requirements of graduate schools and of this or that group of employers. Only good can come from pooling and discussing the basic ideas that are involved in geologic education by all of the parties concerned.

Meeting Highlights

The Society of Exploration Geophysicists convened in New Orleans, Oct. 29-Nov. 1, for their 26th annual meeting, and a substantial portion of the geological fraternity travelled to Minneapolis, Minnesota for the annual meeting of the Geological Society of America and its satellite organizations.

In Minneapolis, the local committee headed by F. F. Grout played host to more than 1000 geologists from widely scattered parts of the country. The pre-meeting field trips that studied the Pleistocene of the upper Mississippi River valley and visited the Duluth Gabbro and Iron Ranges, were well-attended. Blessed with mild but somewhat moist weather, the field trips drew favorable comments from all participants. With the temperature just below the shirt-sleeve range, the double-barreled underwear, parkas, and other arctic apparel found in the geologists' gear were about as useful as a set of matched irons on an antarctic junket.

GEOTIMES has no report on the technical sessions (it doesn't even have a reporter), but we did find that there were 180 miscellaneous scientific papers presented at Minneapolis. The newly-formed Geochemical Society held its first technical sessions. There was only one session which attempted to develop a central theme—that, *"A Symposium on Geological Education,"* is reported elsewhere in this issue of GEOTIMES by Pete Foose. D. M. Davidson of E. J. Longyear Co. presented a very interesting paper at a session of the SEG on "Professional Ethics and Conduct for Economic Geologists." Geomorphologist R. J. Russell took over the reins of GSA from Canadian George S. Hume, who presented as his presidential address details of *"Fault Structures in the Foothills and Eastern Rocky Mountains of Southern Alberta, Canada."* Clifford Frondel, retiring president of the MSA, gave an address, *"Mineralogy of Uranium."* Honored at Minneapolis were Arthur Holmes, the outstanding British petrologist, as Penrose Medallist; A. O. C. Nier, as Arthur L. Day Medallist; A. F. Buddington, as Roebling Medallist; George Kennedy with the MSA Award and A. K. Lobeck with the Neil Miner Award for achievement as a teacher of geology.

Another Canadian, R. F. Leggett, performed nobly in Minneapolis when, as toastmaster at the annual banquet, he steered his way through the traditionally large head table assemblage with the able assistance of Father Hennepin (who discovered Minneapolis a few years back). The toastmaster credited the good Father with this observation on the difference between man and beast, "Man drinks when he isn't thirsty and makes love throughout the year." MSA prexy Cliff Frondell was introduced as a fellow who teaches his students about models . . . and how to make them. Carleton College's President, Larry Gould, the speaker of the evening, gave a humorously punctuated discourse on the program of the International Geophysical Year.

Papers on Gulf

In New Orleans, the Society of Exploration Geophysicists attracted a gathering of more than 500 geophysicists and geologists. It was only natural when meeting on the Gulf Coast that a significant portion of the program should relate to Gulf Coast geology as it is being revealed through geophysical studies. Several of these papers were particularly noteworthy. Paul Lyons, in a paper *"Geology and Geophysics of the Gulf of Mexico,"* concluded that the gulf is an isostatically positive area (gravity high), which is susceptible to additional settling with the added weight of newly deposited sediments, and that magnetic data indicate few, if any, intrusive masses. The geophysical phenomena related to sea mounds were discussed in two papers, one by L. L. Nettleton, the other by W. E. Allen, L. Stanley and T. F. Vining. The sea mounds are interpreted as evidence of salt domes and certain geophysical characteristics may indicate whether or not a cap rock is present over the salt dome.

All was not seriousness with the exploration geophysicists. It is reported that they found some unusual structures to explore on Bourbon Street (based on reconnaissance reports of geologists, November 1955). A number of companies banded together to offer them cheer after a grueling day of technical papers. All hands enjoyed a moonlight cruise on a Mississippi River boat.

AGI Meetings

When AGI President M. M. Leighton

turned over the gavel to newly-elected President J. L. Gillson at the Minneapolis meeting of the Institute's Board of Directors on November 2, he could do so with a real sense of accomplishment. In his year as President the American Geological Institute had weathered a dire financial crisis and appeared headed toward operation on a sound basis. The progress was in no small measure due to persistent, effective efforts of past-President E. A. Eckhardt, who has served as chairman of the Finance Committee.

The Finance Committee reported that a poll of the Board of Directors indicated that they believed the Member Societies should finance the basic operations of the Institute—a cost estimated at $25,000 per year. The cost of GEOTIMES, other publications and other special projects should be met with funds from other sources. To meet this obligation member societies would have to increase their collective contributions from the $14,000 of the past several years to $25,000. The member societies rallied voluntarily to the cause and by mid-November nearly $23,000 of the $25,000 goal had been achieved. AAPG and GSA led the way by increasing their contributions to $10,000 each. The Society of Exploration Geophysicists, at its New Orleans meeting, voted to double its previous contribution of $1,000. Significant action was taken by the Society of Economic Geologists, the Mineralogical Society of America and the American Geology Teachers, who voted ten per cent of their member dues to support of the Institute. For the AGT, this marked their first formal contribution to the Institute.

Approximately twenty business officers and editors of geological journals met with Mr. William Edwards of Edwards Brothers, Ann Arbor, for a preliminary discussion of the possibilities of combined publication of all of the journals in a single plant as a means of effecting savings in printing costs. The AGI will act as a clearing house for further study of the problem.

The Public Education-Public Relations, Government Relations, and Professional Relations Standing Committees of the AGI all met in Minneapolis. A report of their discussions will appear in the next issue of GEOTIMES. The Earth Science Education Extension Committee also met.

The Board of Directors was unanimous in electing the following slate of officers: President, J. L. Gillson; Vice-President, J. V. Howell, and Secretary-Treasurer, Donald H. Dow.

ONE HUNDRED for A G I

Careers in the geological sciences have been satisfying and rewarding to many geologists and geophysicists. When compared with other scientific groups, statistics show that the geoscientists lead, percentage-wise, in the $25,000 and over salary bracket. The Finance Committee of the AGI, headed by Dr. E. A. Eckhardt, expresses the conviction that many of these successful geologist-geophysicists will want to show their appreciation to their profession and their faith in its future through membership in the COMMITTEE OF ONE HUNDRED for the support of the American Geological Institute. The purpose of the committee is to provide a fixed, predictable income of at least $10,000 annually for the Institute over the next five years while it is further consolidating its financial position.

To be enrolled on the COMMITTEE OF ONE HUNDRED, individuals are being asked to pledge $100 or more per year for five years. A nucleus of five men, who have given generously of their time and energies to the AGI, already have pledged their membership in the Committee of 100. The funds will be devoted largely to the AGI program for students and to its efforts in public relations and public education.

Individuals wishing to consider membership on the Committee of 100 may receive pledge forms by writing the American Geological Institute, 2101 Constitution Ave., N.W., Washington 25, D. C. Contributions to AGI are tax-deductible.

Moore Receives Hayden Award

Dr. Raymond C. Moore, President-elect of the Geological Society of America and Professor of Geology, University of Kansas, has been honored with the Hayden Memorial Geological Award of the Academy of Natural Sciences of Philadelphia. Established in 1888 by Mrs. Emma W. Hayden in memory of her husband, Dr. Ferdinand V. Hayden, a former Director of the U. S. Geological Survey, the award is designated to be given for the "best publication, exploration, discovery or research in the science of geology and paleontology, or in such particular branches thereof as may be designated. Dr. Moore is well-recognized for his many scientific publications and for his eminence in scientific leadership.

GEOLOGY *in the Public Eye*

by Bob Bates

Recent contributions to geology-for-the-layman include Bulletins 30 and 31 of the North Dakota Survey. Bulletin 30 is a 20-page leaflet by Wilson Laird, entitled "Guide for Geologic Field Trip in Northeastern North Dakota." After a stratigraphic summary, the bulk of the report describes, with well-labeled cross sections, the glacial history of the area. Special attention is given to Lake Agassiz and the beaches, cliffs, and deltas inherited from it. There is a brief section on economic products, and the report closes with a road log for a trip to illustrate the features discussed.

Bulletin 31, by John Hainer, is called "The Geology of North Dakota." Written for layman and student, it contains 46 pages, 23 photos, and three small state maps showing physiography, relief, and geology. Land forms, stratigraphy, and mineral resources are discussed at length. A sensible feature is a glossary of geologic terms. (You geologists all know what *thenardite* is?)

Recently in the public eye was a high school science teacher in Kalispell, Mont., named Richard M. Nelson. Chosen "Teacher of the Year" by McCall's magazine, Nelson is one of those dedicated, inspiring science teachers of whom we need several thousand more. Among other activities he has set up a new course in earth science, and has prepared a laboratory manual using photos of local geologic features that he took himself from an airplane piloted by a friend. "His work," wrote an admiring citizen, "has brought to the attention of this agricultural and lumbering community the world of science."

D-X Sunray Oil Co. in Tulsa is in its second year of providing opportunity for children of its employees to get acquainted with science at first hand. About 100 youngsters of grades 7 to 12 are allowed the use of Sunray's research laboratories, under supervision, in the evening. Among other projects worked up is a three-dimensional peg model of one of Sunray's oil fields. Four boys constructed the model, which won a medal at the state science fair.

an essay on

DINOSORS

by RICKY EXNER

An essay entitled "Dinosors" was submitted last year to his teacher by 9-year-old Derrick (Ricky) Exner, a third-grade pupil at Welch School in Ames, Iowa.

In it, Ricky says: *"Not many people know what a dinosor is, will I do and would like to tell you about them. Dinespurs were mamath cretchers that lived in the mezazek period. They were realy heuge lizerds, of course they were cold blooded.*

"Wiy did you know that the Transorasrex was related to all the birds in world. One of the bigest of all the dinesors was the Thunder liserd or brontasers bigger stil was his big brother Olosors he was the bigest of them all.

"For millions of years they flerished most in the western Amarika and in Yurp.

"Then in less than onehundred years they vanished and nothing but bones are left of them now. But however bones can tell us a lot about them.

"In meuzems they have bones and their historey, but in the Amarckaen Meusem of natchrel histry They have a whole big room of the skelleions put togather, it is a sight for a kings eyes.

"No one ealy know why the dinesors died out some sinentites think it was becaus the wather got colder. Some think it was becaus the warm blooded animals were eating there eggs. I think it was a little of bolghth. Howabout you?

(Signed)

nathuralist Ricky Exner.

Ricky is the son of Max V. Exner, extension specialist in music at Iowa State College.

Exner copied his boy's theme precisely as it was written and, in sending it to Gordon Gammack, columnist for the Des Moines Tribune, wrote: "Perhaps scientific papers are a little out of your beat, except those of popular interest. Use it if you think it's not too heavy reading."

The father explained further that on completing the essay, Ricky followed his teacher's directions and handed it to Nelsa, the girl behind him, for corrections. The girl made four corrections: A missing period, a misplaced capital letter, and two others—and then gave it her O. K.

In signing his letter, Exner explained parenthetically *"His dad, nathurly."*

Scientific Exchange Proposal

by

RHODES W. FAIRBRIDGE

Before the 20th International Geological Congress met in Mexico City in September most people had heard about the "new look" among Russian scientists. So far as it existed or exists, it is obviously due to national policy. It is probable that, individually, each Russian geologist would like to be recognized by other geologists as a scientist and a fellow human being.

In spite of justifiable skepticism about the new policy, many geologists at the Congress felt that better exchange of ideas and materials was worth a try. Subsequent events have raised new barriers. It is nevertheless still pertinent to remind ourselves that, although the USSR can and does get almost all western scientific literature by straight purchase and translates it extensively, we in North America and those in neutral countries have often experienced the greatest difficulties. Thus, from any cooperative exchange we stand to gain most.

At the International Geological Congress we had a number of exploratory meetings, thanks in part to the "moderating" of chairman Ronald K. DeFord, to the linguistic skill of Dr. George Chilingar and the cooperative spirit of Academician D. I. Scherbakov, leader of the Soviet Delegation; the successful results of these deliberations were placed before the council on the last day. The present writer was asked to make information on the exchange proposals generally available, and the fundamental question of scientific translation and exchange was set down among the suggested items for the agenda of the XXIst International Geological Congress, Copenhagen, 1960.

Correspondence

The first step in most exchanges is to get into correspondence with our "opposite numbers." We indicated to the Russians how to get the addresses of any American geologist. They provided us with a long list of official sources to which we could write and an address list of 3,500 Soviet geologists was given to the International Congress Secretariat for publication.

Exchange of Books & Specimens

If we want fossils or minerals from Russia, the best thing is to write to museum curators or authors of papers, offering material from over here in exchange. This saves complications of funds, prices, etc. Reprints, books and maps can be exchanged either with individuals or with institutions. If you have nothing to offer of your own, you can offer to purchase any book or map on the market to exchange for something of equivalent value, just like school boys trading stamps!

Exchange of Personnel

The possibility of geological tours and the exchange of delegations has been discussed. It is suggested that universities, institutions and societies on both sides of the Atlantic could explore the possibility of exchanging representatives for periodic meetings and conducted tours. It should be realized that although Americans may visit the U.S.S.R. as tourists, an official invitation would have to be extended to enable a Russian visitor to go to the United States.

Abstracts

A new commission of the International Geological Congress (under Dr. Schurmann of Holland) has been set up to explore the problem of international geological abstracts. The desirability of getting English language abstracts of Russian articles is widely recognized, and it is understood that steps are being taken in Russia to provide this service. Furthermore, it is hoped that before long the Doklady of the U.S.S.R. Academy of Science will be published completely in two languages. At the present time a Russian abstracting journal, "Referativne Jurnal-Geologia" is treating world geological literature in the Russian language. For the benefit of English readers, "Bibliography of Geology Exclusive of North America," published by the Geological Society of America, includes very brief abstracts of Russian literature.

Publication in Foreign Journals

Russian geologists have been invited to have their works published in foreign journals. For obvious technical reasons it is not readily possible to publish scientific works written in Russian in most journals

in the United States and Great Britain, but almost all English language journals are ready and willing to accept contributions, provided that the articles are in clear and understandable English.

Translations

It is widely recognized among American geologists that extensive exchange of literature will not do much good unless something can be done about translations. American universities and schools are finding it difficult to obtain competent professors of the Russian language, and extremely few geologists can read the language. The U.S.S.R. has solved this problem by having established several translation organizations operated by the State.

It was suggested at the Mexico meeting that, since American geologists would stand to gain the most from any translations services, a national committee (under the aegis of A.G.I. perhaps) should be formed to consider ways and means. In this same issue of GEOTIMES is a brief account of the National Science Foundation's support of translating services by other disciplines.

Copies of the full report to the Council of the Congress in Mexico by the committe on international scientific exchanges in geology have been mimeographed and are available by writing *RHODES W. FAIRBRIDGE, Department of Geology, Columbia University, New York, N. Y.* This report provides in greater detail information on exchanges with Russian geologists, including names of certain key Russian scientists and organizations.

MSA aids BSA

A new Official BSA Mineral Kit is to be introduced later this year. The Mineralogical Society organized a committee consisting of Clifford Frondel, C. S. Hurlbut, Jr., George Switzer and Charles Milton at the request of Mr. Ted Pettit, Director of Conservation, Boy Scouts of America, to prepare a list of minerals which would comprise the kit. The MSA committee has agreed to review the contents of the kit to be offered by the Boy Scouts of America and has also agreed to provide the text for a booklet to accompany the kit.

The MSA cooperation with the Boy Scouts is the outgrowth of contacts between Messrs. Pettit and Glassey of BSA and Chalmer Cooper, Chairman of the AGI Committee on Boy Scouts, together with Frank Gouin, AAPG Committee on Boy Scouts, and at the suggestion of Charles Milton, U.S.G.S. mineralogist.

NSF Fellowship Program

The National Science Foundation plans to award about 800 graduate and 175 post-doctoral fellowships for the academic year 1957-1958. These awards will be open to all scientific disciplines including earth sciences and will be made to U. S. citizens on the basis of ability.

Graduate fellowships are available to those working toward a master's or doctoral degree. College seniors anticipating graduate studies may apply. Post-doctoral fellowships are open to candidates with a Ph.D. or equivalent training and research experience. Pre-doctoral applicants will be required to take an aptitude test to be given on January 19, 1957. Evaluation of candidates will be made under auspices of the NAS-NRC. The pre-doctoral fellowships carry stipends ranging from $1,800-$2,000 per year while the post-doctoral awards are at $3,600 per year.

Closing date for pre-doctoral (graduate) applications is January 7, 1957, and for the post-doctoral applications December 24, 1956. Further information and application materials may be secured by writing Fellowship Office, National Academy of Sciences—National Research Council, 2101 Constitution Ave., N.W., Washington 25, D. C.

A program of senior post-doctoral fellowship awards is available to candidates of unusual ability who have a science doctorate for at least five years. This program carries stipends ranging from $4,000-$10,000 adjusted to match closely the salaries of recipients. Information and application for these senior post-doctorate fellowships should be requested from the Division of Scientific Personnel and Education, National Science Foundation, Washington 25, D. C.

A Two-Time Winner

One. K. J. (Jack) Murata, analytical chemist with the Geological Survey, has recently returned to the United States after a four-months tour of duty in Brazil, where he served as advisor to the Brazilian Government in spectroscopic methods of geochemical research.

Two. While out of the country Mr. Murata was named as recipient of the Distinguished Achievement Award of the 14th Biennial Convention of the Japanese American Citizens League for his outstanding work in geology and in the application of spectroscopic methods to this field.

1955-56 STUDENT SURVEY

made available by AGI

In 1955-56 there were 3505 graduating seniors majoring in geology and geophysics in the U. S., 510 candidates for M.A. degrees and 170 Ph.D. degrees.

These data are included in "A SURVEY OF GEOLOGY-GEOPHYSICS STUDENTS IN COLLEGES AND UNIVERSITIES OF THE U. S. IN 1955-56, AND OF AVAILABLE SCHOLARSHIPS, FELLOWSHIPS, ASSISTANTSHIPS, ETC." published recently by the American Geological Institute. The Survey was conducted in April 1956 in conjunction with annual registration of graduating seniors and graduate students in the Earth Sciences for the National Register of Scientific and Technical Personnel, maintained in cooperation with the National Science Foundation. The report was compiled by Mrs. Bonnie C. Henderson, Manager of the Register Project for AGI.

The survey indicated that 50 per cent of the graduating seniors planned to seek employment immediately upon graduation and that 32 per cent would enter graduate school. These figures are somewhat inaccurate, however, due to uncertainties over military service. The Survey also showed 2327 third-year students.

The report on the Survey presents in tabular form, for each of 195 schools reporting, the number of students at 3rd year and senior undergraduate levels, and masters and doctoral students at the graduate level. Also included is a tabular summary of scholarships, fellowships, assistantships and other grants in aid available to undergraduate and graduate students in the earth sciences. It is anticipated that this Survey will be made annually.

Copies of this Survey may be obtained from the American Geological Institute, 2101 Constitution Ave., N.W., Washington 25, D. C., at a cost of $0.50. It should prove most helpful to educators, prospective students and personnel executives in industry.

Mexican Congress Publications

A list of publications, prices and ordering instructions for publications of the XXth International Geological Congress, Mexico, 1956, may be received on request from the American Geological Institute, 2101 Constitution Ave., N.W., Washington 25, D. C.

by SANDSTONE SAM

SsS, with a slogan for the AGI Reserve: "It is better to give than to receive—because it's deductible."

* * *

Dinosaur expert W. E. Swinton of the British Museum indicates that dinosaurs have been known to man for only about 130 years and that possibly after 1300 years the general public will realize that dinosaurs and early man did not exist contemporaneously.

* * *

A freshman defines a rock as "something hard and of frequent occurrence."

* * *

Caution—Be sure brain is engaged before putting mouth into gear.

* * *

Ulcers come from mountain climbing—over mole hills.

Russian Translations

Today much attention is being given to translation of Russian Scientific and Technical journals. The National Science Foundation has been sponsoring the translation of Russian works in the field of physics under the supervision of the American Institute of Physics. The American Institute of Biological Sciences has been awarded an NSF grant for the translation of papers on biology and botany, and the American Mathematical Society is engaged in a translating program.

The American Geophysical Union is negotiating similarly to handle the translation of several Soviet geophysical journals beginning in 1957. We hope to bring GEOTIMES readers a more detailed account of this program as it develops.

Along the same lines, a Scientific Translation Center is being established under the auspices of the Special Libraries Association, at the John Crevar Library, Chicago, to collect, announce and sell photocopies of translations of scientific articles from all languages. Announcements will be made through the expanded Translation Monthly available at a $5.00 per year subscription price.

The grants of the National Science Foundation which support these projects are made under its International Science Information Program.

DEAR EDITOR:

A lot of geologists who have seen "Career opportunities in biology," recently published by the Biology Council of the NAS/NRC, try to tell me it puts our geology career pamphlets to shame.

Well, it is a better publication than ours, but the biologists spent dollars on theirs. Ours cost only pennies. The fact that it looks it is not relevant. Two pounds of beefsteak cost more than one pound; a book costs more than a pamphlet. It's simple economics and doggone it, I believe the geology career pamphlet, per penny invested, is every bit as good as that of the biologists.

If the kids in America don't realize the degree to which geologists have the know-how for doing things and getting things for practically nothing—look at the AGI and GEOTIMES, for example — it's just too bad for the kids. Let them go ahead and become biologists. See if I care.

DR. LIVINGSTONE
A thoroughly self-satisfied geologist.

DEAR EDITOR:

May I offer my congratulations to you for the fine start that has been made by the publication of the first three numbers of GEOTIMES. I am turning my copies over to the Library of The Franklin Institute so that they will be generally available.

Although I am not a geophysicist, I continue my membership in the American Geological Union. I had become affiliated with it several years ago when I was a physical chemist at the Geophysical Laboratory. Your news magazine is a good way for me to keep in touch with some of my former associates and the activities in the field of the geosciences.

Very truly yours,
JOHN S. BURLEW
Executive Vice President
Philadelphia, Pa.

DEAR EDITOR:

The example of orbicular weathering shown on the November cover is excellent; but how large are the features in this view? Scale is an important matter in geology. A geologic hammer added to this picture would help considerably.

C. R. LONGWELL

Ed: Our slip *is* showing.

DEAR EDITOR:

We are very much interested in receiving rock, mineral and fossil specimens for our small parochial country school. We have a display case. Any labelled specimens that geologists can send us will be appreciated.

Sincerely,
MRS. HELEN M. LUDWIG
408 S. Prettyman St.
Knox, Ind.

Ed.: Can you help?

DEAR EDITOR:

Would you please change my subscription address to the above. As an ex-science and math teacher, I find your recent articles on the teacher shortage in the secondary schools very interesting. My last teaching job paid $2800 per year and gave me a status somewhere in the realm of dog catchers and garbage collectors — I'm sure that these people have better working conditions.

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MINERALS AND ROCKS 1957 CALENDAR, by Benj. M. Shaub, 159 Elm St., Northampton, Mass. $1.58 postpaid.

Attractive engagement calendar featuring full page photographs of unusual mineral specimens. Ideal last minute gift for the geologist friend or rockhound mate.

HOW TO PAY FOR THAT COLLEGE EDUCATION AND FIND THE MOST SUITABLE COLLEGE, by George Adams, 258 pp., 1956, Harian Publications, Greenlawn, N.Y., $4.95.

This book pulls together a host of pertinent information which will be helpful to the college-student-to-be and his parents. Has many helpful suggestions on financing of the college education and on the selection of the school.

In a section entitled "The principal professional courses offered by American colleges and universities" the author lists twelve schools offering professional training in geology. These twelve are those accredited by the ECPD and do not include a large number of our most outstanding schools in geology. The ECPD is probably more to blame for this error than is the author, for their presentation of these data has proven misleading.

REGIONAL ASPECTS OF CARBONATE DEPOSITION, A SYMPOSIUM, edited by R. J. Le Blanc and Julia G. Breeding, approx. 200 pp., 1956, Spec. Publ. 5, Soc. of Econ. Paleontologists and Mineralogists, Box 979, Tulsa 1, Okla. $4.50.

CONTRACTS, SPECIFICATIONS, AND ENGINEERING RELATIONS, by Daniel W. Meid & J. R. Ackerman, 427 pp., 3rd Edit. 1956, McGraw-Hill Book Co., Inc. $7.00

This book, written expressly for the engineer, contains much information which can be related to the practise of geology. It discusses contracts and contract procedures, obligations of contracts, and specifications. Engineering geologists and geophysicists in particular will find this a helpful reference book.

ELEMENTARY CRYSTALLOGRAPHY: An Introduction to the Fundamental Geometrical Feature of Crystals, by M. J. Buerger, 528 pp., 1956, John Wiley and Sons, Inc., New York 16, N. Y. $8.75.

There has long been a need for a textbook in crystallography to supply a comprehensive introduction to the subject not possible in the usual mineralogy textbook. This book achieves this end with a systematic development of the elements of crystal symmetry. It will undoubtedly find a place as a textbook and be used extensively as a reference book.

COMMON SENSE IN RESEARCH AND DEVELOPMENT MANAGEMENT, by George W. Howard, 104 pp., 155 Vantage Press, N. Y., $2.75.

Persons interested in/and managing research and development will find this little book worthwhile, for it discusses many practical aspects observed in a study of industry, institutional and government research.

GEOLOGY OF THE FOOTHILLS OF THE FRONT RANGE IN NORTHERN COLORADO, by Zera M. Hunter, published by Rocky Mtn. Assoc. of Geol. 1955, available from Petroleum Information, Box 2612, Denver, Colorado, $2.50.

A black and white geologic map, scale 1:48,000, showing formation boundaries and geologic structures; accompanied by text describing formations.

SEGp Essay Awards

The Society of Exploration Geophysicists awarded three cash prizes for student essays at their recent annual meeting in New Orleans. Selected for the honors by the SEGp award committee headed by F. J. Agnich were Thomas V. McEvilly for his paper, "Abnormal Sedimentary Susceptibilities in Eastern Missouri," first prize of $150; Ronald E. Diederich, second prize of $100 for his paper, "A Review of the Rayleigh Wave," and Emil J. Mateker, Jr., for his paper, "Gravity Survey of the Cap Au Gres Structure in the Brussels-Hardin Quadrangles, Illinois," third prize of $50. McEvilly and Mateker are students at St. Louis University while Diederich is at the Colorado School of Mines.

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NEW *Ideas Products Services*

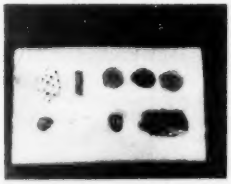
GEO-TIMES will welcome press releases and notices of new ideas, products and services from companies and individuals for possible use in this section.

New Catalogue of Craf-Tone map patterns and symbols and Craf-Type faces is available. Lists many map symbols and patterns on adhesive-backed transparent sheets which have wide application in the production of geologic maps and charts. Catalogue may be obtained free by writing on your letterhead to **Craftint Manufacturing Co., Dept. G12, 1615 Collamer Ave., Cleveland 10, Ohio.**

Laboratory dedicated. A new building to house research and manufacturing facilities of **Houston Technical Laboratories** was formally dedicated in late October.

HTL is a subsidiary of Texas Instruments Incorporated and is one of the larger producers of geophysical exploration equipment. The building, completely modern in design, may be readily expanded to meet future growth of the company. Another member of the Texas Instruments family is Geophysical Service Inc., an exploration service company.

Fossil Hunters Field Comparison Kit. A collection of nine representative fossils



embedded in plastic foam and with a transparent plastic cover with an accompanying descriptive mimeographed pamphlet. A thought for a Christmas gift for that embryo geologist-paleontologist. Avaliable at $2.50 postpaid from **Ward's Natural Science Establishment, Inc., P. O. Box 24, Rochester 9, New York.**

Model 30 Core Drilling Machine is described in detail and illustrated in a new 8-page Bulletin No. 350, which may be obtained by writing on company letterhead to **Sprague & Henwood, Inc., Scranton 2, Pa.**

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POSITIONS WANTED

BOX 242. GEOLOGIST, 35, B.S., married, 5 years' major oil company experience in northern New Mexico and West Texas, including administrative, seismic and some surface work. Desires to relocate. Excellent references.

BOX 246. Economic Geologist, 36, M.S. degree, wishes to associate with domestic or international consultant, investment or exploration group or represent U. S. mineral interests in Europe. 9 years of domestic and foreign exploration and evaluation experience in metallic and non-metallic minerals. Working knowledge of Spanish, German, French. Aerial photo interpretation and commercial pilot.

BOX 251. Geologist, 26, M.S.-1954, recent vet, single. No experience, need it. Desires research and/or exploration position in U.S.A.

BOX 252. Chairman small Geology Department, 41, wishes post in University or small College preferably in Mid-west or West. M.S. Geophysics: Ph.D., Sedimentation and Economic Geology; 10 years commercial work primarily in petroleum and non-metals; Professor 9 years. Might consider commercial research.

BOX 253. Petroleum Geologist, 37, B.S. 8 years experience, West and Central Texas, major and independent, subsurface, mapping, production, engineering, evaluation, management. Now District Geologist small operator, desires responsible position with substantial company.

VACANCIES

MICHIGAN STATE UNIVERSITY, East Lansing, Michigan, has an opening beginning September, 1956, for a young man wishing to develop geophysics and hydrology. Salary and rank dependent on qualifications. Write: B. T. Sandefur, Dept. of Geology.

DARTMOUTH COLLEGE, Hanover, N. H. Glacial geologist-geomorphologist for an opening in September of 1957. Ph.D. required. Preference to men 32 or younger. Salary and rank dependent on qualifications.

GEOLOGIST for resources survey. Well-trained geologist, with diversified field experience, preferably some graduate work, with sincere interest in field work, preparation maps and reports, to function as group leader with two assistants. Large-scale geological mapping program, California and Nevada, permanent, under 45, minimum 5 years experience regional and areal geological mapping with emphasis on location mineral resources. Salary, $600 to $700 per month depending on experience and qualifications, plus monthly living expenses, single or married. Publication privileges permitted. Field headquarters moved every 4-5 months to take advantage mapping weather. If interested, submit resume personal data, experience, references, availability to: Chief Geologist, Southern Pacific Co., Rm. 205, 65 Market Street, San Francisco, California.

MISSOURI SCHOOL OF MINES has opening on its staff for an Assistant Professor of geophysics qualified to teach the various methods of exploratory geophysics to students in mining and geology. Field experience required. Summers available for consulting. Salary open and based on nine months of service. Address correspondence to O. R. Grawe, Chairman, Geology Dept.

BOX 75. Field and lab man. Ingenuity, willing, with interest in speleology as applied to geochronological sciences a prerequisite. Prefer active young man. Learn archeo-paleo methods. Degree not essential.

DENVER RESEARCH CENTER, The Ohio Oil Company, has opening for geologic technician. Duties include thin section preparation, sediment analysis, core analysis, preparation of samples for chemical analysis and occasional assistance in field work. Several years experience preferred. A new research laboratory in suburban Denver. Address P. O. Box 269, Littleton, Colorado.

TRINITY COLLEGE will need a permanent Instructor in geology, beginning Sept., 1957, to teach structural geology, geology of North America, introductory geology, and two other one-term courses. Ph.D. degree requirements must be completed or nearly completed. Salary dependent upon qualifications. Ample time and fine location for research in structural and glacial geology. Summers may be spent as desired. Write: Chairman, Dept. of Geology, Trinity College, Hartford, Conn.

MONTANA STATE UNIVERSITY, Missoula, Montana, Ph.D. to teach optical mineralogy, petrography, also general geology and some field methods, September 1957. Write Chairman, Dept. of Geology.

JAMAICA. Openings available for two geologists to do surface mapping. Fundamental experience required and photo-geological and micropaleontological backgrounds would be helpful. Write Transair Exploration Ltd., Box 380, Kingston, Jamaica, B.W.I.

COLORADO SCHOOL OF MINES, Golden, Colorado. Because of departmental growth there will be a September 1957 opening for Assistant Professor qualified to teach Mineralogy, Petrology, and Mineralography. Ph.D. required. Write L. W. LeRoy, Dept. of Geology.

BOX 76. PETROLEUM EXPLORATION GEOLOGIST for Internat. consulting firm. Competent exp. and ability necessary. 4 yrs. exp. or more, preferred in Texas and/or Gulf Coast. Salary plus interest, prob. loc. Dallas.

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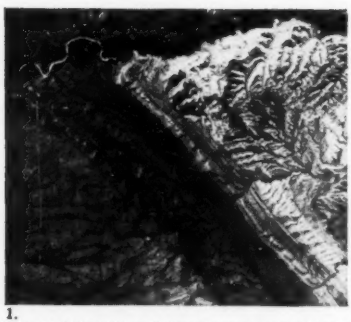

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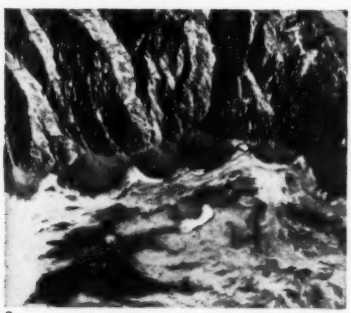

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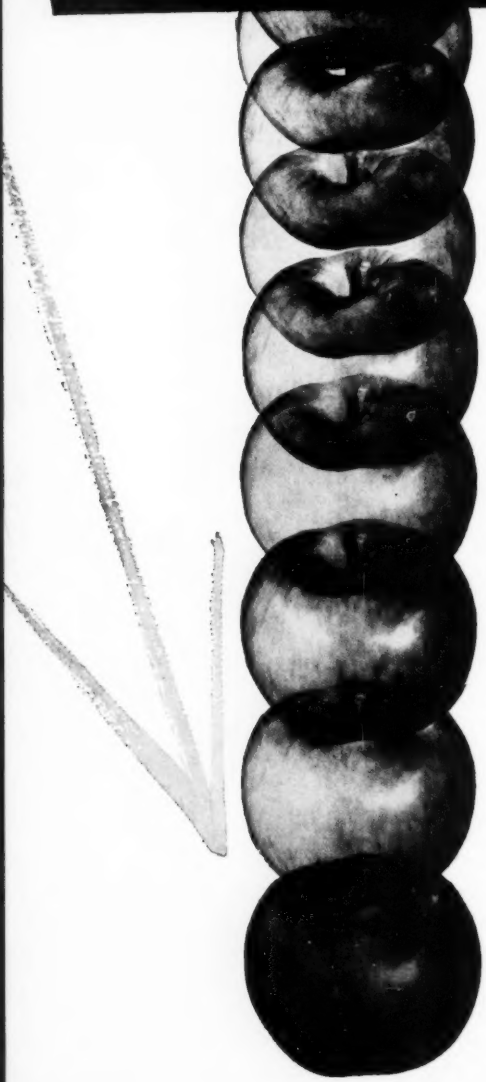

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